

REMARKS

Claims 1-14, and 18-34 are pending in the application. Claims 1, 19, 20 and 22 have been amended. Claims 15-17 have been canceled without prejudice or disclaimer. New claims 35 and 36 have been added. No new matter has been added. Reconsideration of the claims, in view of the comments provided below, is respectfully requested.

Applicants thank the Examiner for indicating that claim 16 contains allowable subject matter.

Claim Objections

Claim 19 was objected to for an informality. Claim 19 has been amended to remove the informality.

Rejection under 35 U.S.C. § 103(a)

Claims 1-19

Claims 1-11, 18 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen et al. (U.S. Patent No. 6,459,487) (Chen). Chen teaches a measurement system having a number of operative elements: a computer 10 with frequency period analysis software, a tunable laser 12 operated in a wavelength scanning mode by the computer 10 using scanning control algorithms, a polarization scrambler 14, an optical measurement bench 16, a power meter 18 to which the laser beam can be directed after the bench 16 at a junction 19 comprising a switch, fiber or splitter, and an optical spectrum analyzer 20 (col. 5, lines 36-46).

The optical measurement bench 16 consists of a series of polarization beam splitters, 1/2 waveplates and polarizers, as seen in both FIGS. 1 and 2, which show an input collimator 30, a polarizer 32 oriented at 45° to the horizontal, a first horizontal beam displacer 34, and a true zero order 1/2 waveplate 35 to rotate the polarization of the displaced e and o beams by 90° before one or more glass elements to be measured for optical path length. A second horizontal beam displacer 40 follows the windows 36, 37 to recombine the two beams. An output polarizer 42 is oriented at -45° to the horizontal (col. 5, line 56 – col. 6, line 32).

Claim 1 has been amended to include the limitations of claims 15 and 16. Claim 16 was indicated to contain allowable subject matter in the Office Action. Claims 15-17 have been

canceled. Therefore, claim 1 and claims 2-11, 18 and 19, which depend from claim 1, should now be allowable.

Claims 12-14 are rejected as being unpatentable over Chen in view of Brooks et al. (U.S. Patent No. 5,675,411) (Brooks). Since claims 12-14 depend from allowable claim 1, this rejection is moot and claims 12-14 are allowable.

Claims 20-26

Claims 20-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen et al. (U.S. Patent No. 6,459,487) (Chen).

Three criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or combination of references, must teach or suggest all the claim limitations. MPEP § 2142. Applicant respectfully traverses the rejection since it would not be obvious for one of ordinary skill in the art to modify the reference in the manner suggested to obtain the claimed invention.

Independent claim 20 is directed to an interferometer that comprises polarization beam splitting means for splitting an incoming polarized light beam into first and second light beams of orthogonal polarization and polarization beam combining means for combining the first and second light beams of orthogonal polarization into an output beam. The polarization states of the first and second light beams are maintained between the polarization beam splitting means and the polarization combining means. Polarization sensitive detection means is provided for detecting polarization of the output beam and wavelength selection means is used for selecting a wavelength of light detected by the polarization sensitive detection means.

Independent claim 22 is directed to a polarization interferometer that comprises a birefringent beam splitter having an input path and first and second output paths and a birefringent beam combiner having first and second input paths and an output path. The first and second input paths of the birefringent beam combiner are aligned respectively with the first and second output paths of the birefringent beam splitter. Polarization states of light propagating along the first and second output paths from the birefringent beamsplitter to the birefringent beam combiner remaining unchanged between the birefringent beamsplitter and the birefringent beam

combiner. A polarization sensitive detector is disposed on the output path of the birefringent beam combiner.

Chen fails to teach all the elements of claims 20 and 22 and, in fact, teaches away from these claims. Chen teaches that the optical bench consists of a series of polarization beamsplitters, $\frac{1}{2}$ waveplates and polarizers (col. 5, lines 56-57) and that the $\frac{1}{2}$ waveplate (35) is a true, zero order $\frac{1}{2}$ waveplate disposed between first horizontal beam displacer (34) and the second horizontal beam displacer (40). The $\frac{1}{2}$ waveplate is used to rotate the polarization states of the light in the two light beams passing from the first horizontal beam displacer (34) to the second horizontal beam displacer (40) (col. 6, lines 10-13).

In the invention according to claim 20, the polarization states of the first and second light beams are maintained between the polarization beam splitting means and the polarization combining means. This contrasts with Chen in which the polarization states of the beams are rotated, and thus not maintained, on passing between the first horizontal beam displacer (34) and the second horizontal beam displacer (40).

In the invention according to claim 22, the polarization states of light propagating along the first and second output paths from the birefringent beamsplitter to the birefringent beam combiner remain unchanged between the birefringent beamsplitter and the birefringent beam combiner. Again, this contrasts with Chen in which the polarization states of the beams are rotated, and are therefore changed, on passing between the first horizontal beam displacer (34) and the second horizontal beam displacer (40).

Furthermore, since Chen states that the optical bench consists of the $\frac{1}{2}$ waveplate, one would understand that the $\frac{1}{2}$ waveplate must be present.

Chen failed to teach or suggest that the polarization interferometer can be made to operate without the use of a half-waveplate between the beam splitter and combiner. Omission of an element with retention of the Element's function is an indicia of unobviousness, *In re Edge*, 359, F.2d 896, 149 USPQ 556 (CCPA 1966), MPEP § 2144.04.II.B. According to Applicant's design, as claimed in claims 20 and 22, omission of the $\frac{1}{2}$ waveplate, and thus maintenance of the polarization states between the splitter and combiner can still lead to the ordinary ray in the beam splitter being an extraordinary ray in the beam combiner, and the extra-ordinary ray in the beam splitter being an ordinary ray in the beam combiner. Thus, the function of the $\frac{1}{2}$ waveplate is

maintained but the $\frac{1}{2}$ waveplate itself is omitted. Accordingly, applicants believe that the inventions of claims 20 and 22 are patentable over Chen.

Dependent claims 21 and 23-26, which depend from claims 20 and 22 and further define the inventions of claims 20 and 22, were also rejected under 35 U.S.C. §103(a) as being unpatentable over Chen. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent claims 20 and 22. Therefore, dependent claims 21 and 23-26 are also in condition for allowance.

Dependent claims 27-34

Dependent claims 27-34 are rejected as being unpatentable over Chen in view of Brooks. Brooks teaches a spectrometer that uses a fiber-optical transformer having an arcuate one-dimensional input region and a rectangular output region for illuminating the active area of a two dimensional sensor. The input region is coincident with a Rowland circle of the spectrometer (Abstract).

Brooks fails to rectify the deficiencies of Chen discussed above with respect to claim 22, and so claims 27-34 are also allowable.

Dependent claims 35 and 36

New claims 35 and 36 have been added and depend from independent claim 22. Support for claim 35 is provided in FIG. 6 and its description in the specification and support for new claim 36 is provided in FIG. 4 and its description in the specification. No new matter has been added.

Conclusion

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at (612) 436-9610.

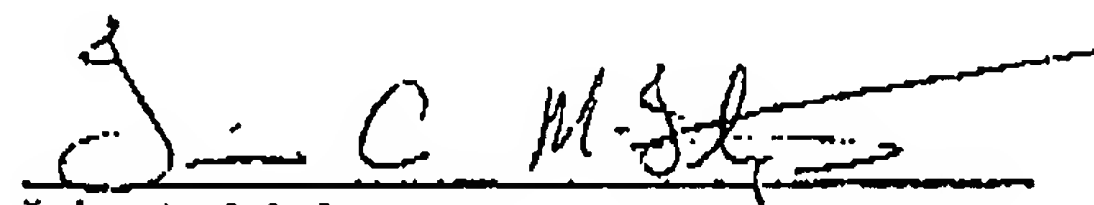
Respectfully submitted,

CCVL

Customer No. 38846

Date: January 6, 2003

By:


Iain A. McIntyre
Reg. No. 40,337